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(54) An electric driving motor for delivering a medium acting as an electrolyte

(57) A motor 18 for driving a fuel delivery pump, the fuel being an electrolyte is surrounded by a housing 10 through which the medium flows and which thus flushes the motor armature and commutator 26. In order to prevent the commutator part 31, which is in contact with the brushes 29 from being eroded by the fuel, this part is made of carbon. The part for connection to the windings is made of copper. The motor is especially suitable for use with alcohol fuels (M15, M100, E100 etc.), which have high electrical conductivity.

FIG.1

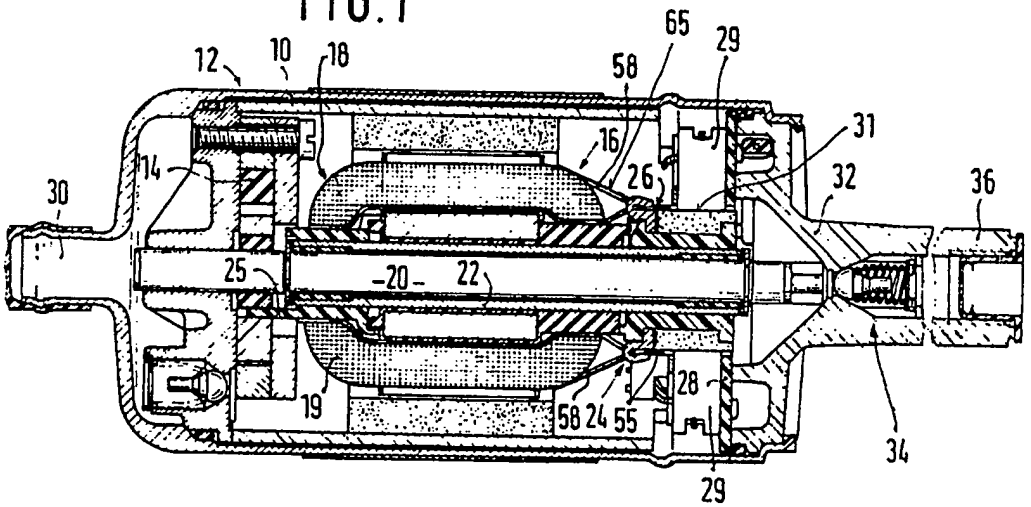

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FIG.1

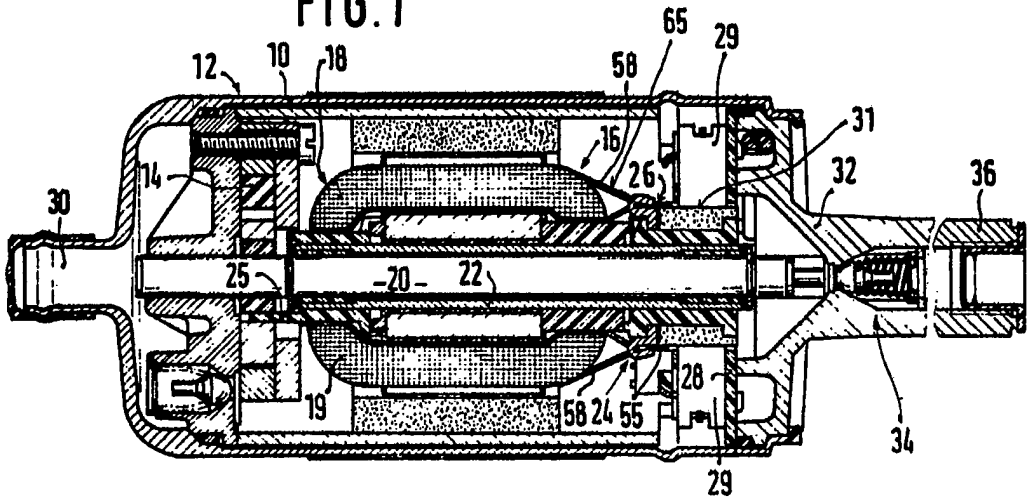


FIG.2

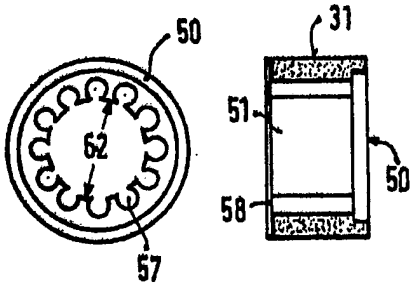


FIG.3

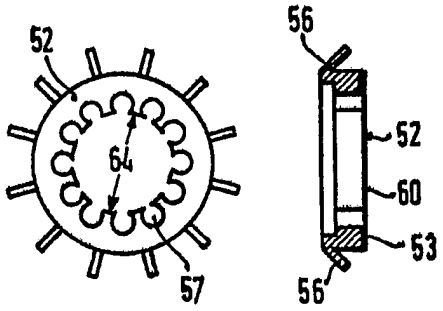


FIG.4

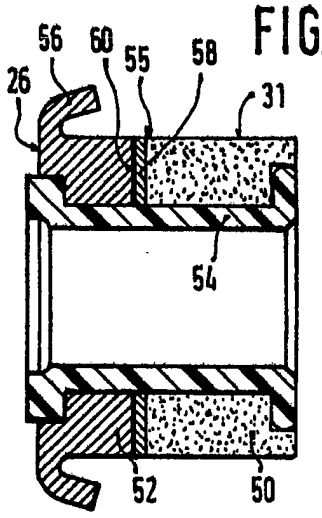
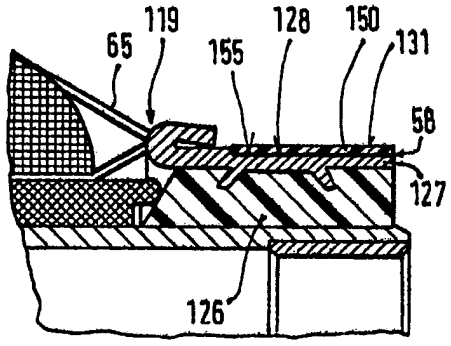


FIG.5



SPECIFICATION

An lectric driving motor for delivering a medium acting as an electr lyt

State of the art

The invention originates from an electric driving motor according to the preamble to the main claim. Such a driving motor is already known which operates without any problems when delivering fuels customary up until now because their electrical conductivities lie in the pico Siemens range (pS); thus are extraordinarily low. However, with alcohol fuels, which for example contain 15% Methanol (M15), being considered to a greater extent at the present time, the electrical conductivity lies in the micro Siemens range (μS). Thus, it follows that the Methanol combines with water. With pure Methanol (M100) or Ethanol (E100)—fuels their electrical conductivity increases due to their susceptibility to oxidation and the formation of formic acid (in the M100) or the formation of acetic acid (in the E100) associated therewith. With electrical conductivities in the micro Siemens range these liquids indeed act as electrolytes so that, due to the potential difference in the motor, wear takes place on the bare current conducting conductors lying on the anode side. One of the motor components affected thereby is the commutator normally consisting of copper. After a predetermined operational period of the driving motor this electrolysis leads to destruction of the commutator and thus to the breakdown of the delivery unit.

Advantages of the invention

As opposed to this, the electric driving motor in accordance with the invention comprising the characterising features of the main claim has the advantage that when delivering liquids having a relatively high electrical conductivity, the commutator can no longer be attacked and the operational reliability of the electric motor is fully retained.

Advantageous further developments and improvements of the delivery unit set forth in the main claim are made possible by the measures set forth in the sub claims.

Drawing

Figure 1 shows a longitudinal section through a unit for delivering fuel including an electric motor, Figure 2 is a top view and a section through a part consisting of carbon of the commutator forming part of the electric motor, Figure 3 is a second part which forms part of the commutator, Figure 4 is a section through the assembl d commutator and Figure 5 is a section through a differently c nstructed commutator for the driving motor in accordance with th invention.

Description of the invention

A fuel delivery unit illustrated in Figure 1 has a tubular housing 10 a region 12 provided with a roller-type pump 14 and a region 16 provided with an electric motor 18. The r ller-type pump 14 and the electric motor ar mounted in the housing 10 axially one behind the other. The drive for the roller-type pump 14 takes place from the electric motor 18 to a rotatably mounted component which can be either a common motor and pump shaft or—as provided with the present embodiment—a common bush 22 rotatably arranged on a stationary shaft 20 and which engages by means of at least one driving pin 25 in a corresponding recess in the pump rotor. The construction of the roller-type pump 14 can be of the usual kind. Since it is not the subject of the present invention a detailed explanation of the pump 14 will be omitted in the following.

The commutator region 24 is located at the end of the electric motor 18 remote from the roller-type pump 14 and consists of the commutator 26 of the electric motor and a brush carrier plate 28 provided with brushes 29 with which is associated a slide track 31 on the peripheral surface of the roller-like commutator 26.

At its end provided with the pump 14, the tubular housing 10 has a suction union 30 whilst the other end of the housing near the brush carrier plate 28 is closed by an end flange 32 which has a pressure union 36 provided with a non-return valve 34. In the operation of the unit, the fuel is drawn through the suction union 30 and is forced by the roller-type pump 14 through the interior of the housing 10, with the non-return valve 34 open, and out of the pressure union 36. In so doing, the entire electric motor 18 including its armature 19 provided with windings—which is arranged on the rotatable bush 22—and also the commutating device 26, 29 is flushed by the fuel.

As Figure 4 in particular shows, the commutator 26 consists essentially of three separate parts; an annular commutator portion 50 provided with the slide track 31 for the brushes 29—which is produced from a conductor material not reacting with plastics, preferably from a sinter material of high carbon content—(Figure 2) another likewise annular commutator portion 52 made of copper (Figure 3) and a common plastics bush 54 (Figure 4). The copper commutator portion 52 has terminal tags 56 which serve for making contact with wires 58 (Figure 1) of the armature windings. As can be seen from Figure 4, the two commutator portions 50 and 52 are so combined in the finished commutator 26 that the annular surfaces 51 and 53 lie adjacent to one another and thus provide a seam 55 (Figure 1) lying transversely with respect to the rotary axis of the motor armature 19. Each of these annular surfaces 51 and 53 is provided with a layer 58 or 60 which can be soldered r welded (Figur s 2 and 3) which, as regards the commutator portion 50, can be a copper sintered layer 58 which is sintered onto the commutator p rtion 50 during its manufacture. However, it is also possible to apply th layers 58 and 60 t the annular surfaces

51 and 53 of the commutator portions 50 and 52 by vapour deposition, electrically, or by means of a metallizing bath. In that case it is recommended to apply the said layers directly to the portion 50 in the form of nickel or copper. It is also possible to provide the copper sintered layer 58 with an additional nickel layer. This layer also serves as a blocking layer which prevents diffusion, for example of the solder, into the open pore network of the copper sintered layer 58. Likewise, the annular surface 53 of the copper commutator portion 52 can remain uncoated. The diameter of the bores 62 and 64 in the two commutator portions 50 and 52 is greater than the diameter of the component which the motor armature 19 carries in the form of a rotatably mounted bush 22. When the two commutator portions 50 and 52 are combined into a common portion—by the application of heat and if necessary a further material such as for example tin solder, the internal diameter of the said combined portion is reduced by applying a plastics bush 54 to the outer diameter of the bush 22 so that a perfect mounting of the finished commutator 26 on the bush 22 is guaranteed. To ensure a more reliable connection between the two commutator portions 50 and 52 on the one hand and the sleeve 54 on the other hand, the commutator portions are provided with recesses 57 open towards the bores 62 and 64. The sleeve 54 is preferably introduced into the combined commutator portions 50 and 52 by injection.

So that the windings of the motor armature 19 cannot be attacked by the fuel acting as an electrolyte they are coated with a material resistant to the fuel. This layer 65 extends from the motor armature 19 at least up to the seam 55 between the two armature portions 50 and 52 so that the armature portion 52 consisting of copper and if necessary also the seam 55 are also fully protected. The layer 65 also protects the current carrying portions from electrical disconnection which can be produced by washing out and scouring.

This arrangement is also provided with the commutator 126 according to Figure 5 wherein the commutator is of a similar construction to the usual commutators—thus having a copper sheath 127. However, as a modification of that, the commutator 126 according to Figure 5 has an annular extension 128 which is completed with a tubular second commutator portion 150 consisting of a conductor material, preferably of carbon, not reacting with the fuel. The annular seam 155 surrounding the rotary axis of the motor armature 119 is produced in that way which, having regard to its construction—in layers and layer sequence—corresponds to the construction of the seam 55 according to Figure 4 already described. With the commutator 126, the slide track 131 for the brushes 29 is also located on the outer surface of the commutator portion 150.

After the commutator portions 50 or 150 consisting at least predominantly of carbon are connected to the other commutator portions 52 or 127, the commutator portions 50 or 150 are so sawn that commutator segments are provided necessary for the commutation.

Claims

1. An electric driving motor of a delivery pump for a medium acting as an electrolyte, particularly for fuel from a storage tank to a combustion engine, the rotatably mounted armature of which provided with windings is flushed by the medium whereby the windings together with a commutator forming part of a commutating device are contacted, characterised in that, the commutator (26 or 126)—or its individual segments—is made at least partially from a conducting material not reacting with the medium, particularly carbon.

2. A driving motor according to claim 1, in which brushes fixedly held with respect to the frame are urged against the commutator, characterised in that, the commutator (26 or 126) is made from the conducting material, particularly carbon, at least in the region forming the slide track (31 or 131) for the brushes (29).

3. A driving motor according to claim 2, characterised in that, the commutator (26) consists of at least two portions (50 and 52) which are connected at a seam (55) lying transversely with respect to the rotary axis of the motor armature (19) and that one of the commutator portions (50) including the slide track (31) is made from the conducting material, particularly carbon.

4. A driving motor according to claim 3, characterised in that, the other commutator portion (52) including the contact points (56) for the armature windings consists of a conductive material preferably copper.

5. A driving motor according to one of claims 3 or 4, characterised in that, one commutator portion (50 or 150) is provided on its surface (58) facing the other commutator portion (52 or 126) with a layer (58) which can be soldered or welded.

6. A driving apparatus according to claim 5, characterised in that, the layer (58) is a sintered layer preferably produced together with the one commutator portion (50 or 150).

7. A driving motor according to one of claims 5 or 6, characterised in that, the layer (58) is a copper sintered layer.

8. A driving motor according to claim 5, characterised in that, the layer (58) consists of nickel.

9. A driving motor according to claim 8, characterised in that, the layer (58) is vapour deposited on the surface (51) of one of the commutator portions (50 or 150).

10. A driving motor according to claim 8, characterised in that, the layer (58) is applied galvanically to the surface (51) of one of the commutator portions (50).

11. A driving motor according to claim 8, characterised in that, the layer (58) is applied by

means of a chemical metallizing bath.

12. A driving motor acc rding to one of claims 6 to 11, characterised in that, the layer consisting of nickel is applied to the sintered layer (58).

13. A driving motor according to one of claims 3 to 12, characterised in that, the two commutator portions (50, 52 or 126, 150) are connected to one another by the action of heat.

14. A driving device according to claim 13, characterised in that, at least one additional material, for example soldering tin, is applied to the seam (55 or 155) for connecting the two commutator portions (50, 52) together.

15. A driving motor according to one of claims 3 to 14, in which the tubular commutator has the slide track for the brushes on its outer surface and a component carrying the motor armature passes through it, characterised in that, the diameters of the bores (62, 64) in the two commutator portions (50, 52) are greater than the diameter of the rotatable component (22) and that the diameters of the bores of the two commutator portions (50, 52) are reduced to the diameter of the component (22) by means of a common sleeve (54).

16. A driving motor according to claim 15, characterised in that, the sleeve (54) consists of plastics and is inserted, preferably injected, into the bores (62, 64) of the two commutator portions (50, 52) connected to one another.

17. A driving motor according to claim 1, characterised in that, the windings of the motor armature (19) are covered, preferably coated, with a material resistant to the fuel.

18. A driving motor according to claim 17, characterised in that, the cover layer (65) located on the windings extends at least up to the seam (55) between the two commutator portions (50, 52 or 126, 150).

19. A driving motor according to one of claims 1 or 2 as well as according to one of claims 4 to 18, characterised in that, the commutator (126) consists of at least two portions (127 and 150) which are connected to one another at an annular seam (155) surrounding the rotary axis of the motor armature (19) and that the outermost tubular commutator portion (150) is made of carbon.

20. A driving motor according to claim 19, comprising a commutator surrounding the rotary axis of the motor armature and having a cylindrical copper sheath consisting of individual systems, characterised in that, the copper sheath (127) of the commutator (126) has an annular extension on its outer surface the outer diameter of which matches the inner diameter of the commutator portion (150).

21. A driving motor according to one of claims 19 or 20, characterised in that, the inner wall of the tubular commutator portion (150) is provided with a metal layer adhering thereto.

22. A driving motor according to claim 21, characterised in that, the metal layer serves as a diffusion layer.

23. A driving motor according to claim 21, characterised in that, the metal layer serves as a connecting agent between one of the commutator portions (150) and the copper sheath (127).

24. The use of an electric driving motor according to one of claims 1 to 23 for a delivery unit through which the fuel flows, the motor housing portion of which is the delivery line.

25. An electric driving motor for a pump delivering an electrolyte, substantially as herein described with reference to Figures 1 to 4 or Figure 5 of the accompanying drawings.

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An el ctric driving motor for delivering a m dium acting as an l ctrolyt

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Abstract

A motor 18 for driving a fuel delivery pump, the fuel being an electrolyte is surrounded by a housing 10 through which the medium flows and which thus flushes the motor armature and commutator 26. In order to prevent the commutator part 31, which is in contact with the brushes 29 from being eroded by the fuel, this part is made of carbon. The part for connection to the windings is made of copper. The motor is especially suitable for use with alcohol fuels (M15, M100, E100 etc.), which have high electrical conductivity.